

REMARKS

Please reconsider the application in view of the above amendments and the following remarks. Applicant thanks the Examiner for carefully considering this application.

I. Disposition of Claims

Claims 1-7 are pending in this application. Amended claims 1, 5, and 7 are independent. Claims 3, 4, and 6 depend, directly or indirectly, from claim 1. Claim 1 has been amended in this reply for clarity. Claim 2 has been cancelled in this reply. Further, claim 3 has been amended for clarity. Claims 5 and 7 have been rewritten into independent form.

II. Rejections under 35 U.S.C § 103

A. Nellissen

Claims 1, 2, and 5-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,937,493 ("Nellissen"). Claims 1, 5, and 7 have been amended by this reply. To the extent that this rejection still applies to the amended claims, this rejection is respectfully traversed.

The present invention relates to a multilayer circuit board. In one or more embodiments, the multilayer circuit board includes a substrate, which has a first surface and a second surface, which extends from an end of the first surface at a required angle with respect to the first surface. For example, in one or more embodiments, the first surface is a top surface of the substrate and the second surface is a side of a projection of

the first surface. Figure 1A of the present application illustrates a substrate (10) having a first surface (11) and a projection (13). The projection (13) includes a second surface (12), which is a side surface. See, *e.g.*, pages 8 and 9 of the instant specification.

Further, the multilayer circuit board includes a multilayer circuit, which is formed on the first surface of the substrate. This multilayer circuit is composed of a plurality of circuit layers. Each circuit layer includes a conductive layer, which has a required circuit pattern and an insulation layer formed on the conductive layer by film formation. Please see, *e.g.*, pages 11-13 of the instant specification.

Additionally, a second conductive layer is formed on the second surface of the substrate by which a layer-to-layer connection of the multilayer circuit is established, *i.e.*, a conductive layer of one circuit layer is electrically connected to another conductive layer of an adjacent circuit layer through the second surface. In particular, the present invention requires that the second surface include a side surface of a projection through which an electrical connection is established. In other words, the electrical connection between conductive layers in adjacent circuit layer is established through a side surface of a projection of a substrate. See, *e.g.*, pages 17-19 of the instant specification. Claim 1 has been amended to include the limitation "*wherein the second surface of said substrate includes a side surface of a projection on the first surface.*"

The present invention, in one or more embodiments, may provide several advantages. For example, the number of potentially formed projections to be formed on the substrate can be reduced, because the electrical connections are established on the side surface of a projection of a first surface. Additionally, a top surface of the projection can be used to make electrical connection between circuit patterns, thereby concentrating

many of the circuit patterns for layer-to-layer connections on one projection. Therefore, it is possible to further facilitate high-density wiring and achieve space saving. Furthermore, laser-patterning operation used to form the circuit patterns is made easy, because the laser beam is scanned in only the longitudinal direction. Also, the second conductive layer plays a dual role: as a circuit pattern and as an electrical connection between layers. Consequently, the formation of layer-to-layer connection between the conductive layers occurs simultaneously with the formation of the conductive layer of the multilayer circuit.

In contrast, Nellissen teaches a multilayer composition of conductive layers (13 in Figures 12 and 13) and insulation layers (15 in Figures 12 and 13) generated by deposition on a substrate. The insulation layer (29 in Figure 12) is then etched away thereby exposing a number of contact windows (31' in Figure 12), or areas where the conductive layers are exposed. Localized electrical contact layers (33 and 33' in Figure 13) are provided at these contact windows, such that electrical connection between conductive layers (13) is established through the localized electrical contact layers. For example, Nellissen states, "the layers 33' [localized electrical contact layers] make electrical contact with the edges 113, 123 of the conductive layers 13 and 23, respectively," (col. 7, ll. 29-31).

On the other hand, in Figure 6 of the instant specification, an electrical connection between conductive layers is established through a side surface of a projection of a first surface. The instant specification states with respect to Figure 6:

a second surface 15 projecting in a substantially vertical direction from one side of the first surface, a multilayer circuit formed on the substrate 10 which is formed by alternatively laminating a conductive layer (20, 22, 24, 26) and an insulation layer (30, 32, 34) on a required number of times. The conductive layer extends on the second surface, which is used to make a layer-to-layer connection between the conductive layers (20, 24). (See page 16, ll. 12-18.)

Because Nellissen does not teach, "a second conductive layer formed on the second surface of said substrate, by which said conductive layer of one of said circuit layers is electrically connected to said conductive layer of another one of said circuit layers, wherein the second surface of said substrate includes a side surface of a projection on the first surface," as recited by amended claim 1, claim 1 is patentable over Nellissen. Thus, dependent claims 2 and 6 are likewise patentable for at least the same reasons. Claim 7 having a similar limitation is also patentable for at least the same reasons.

Similarly, Nellissen does not teach "a part of the first surface is exposed, and an electronic device is mounted in a concave formed in the exposed first surface, and an electrical connection between said multilayer circuit and said electronic device is made by a third conductive layer formed on an inner surface of said concave," as recited in amended claims 5. Nellissen is completely silent to an electronic device mounted in a concavity formed in the exposed first layer, which facilitates electrical connection between conductive layers. (See Figure 17 of the instant specification, for example.) Again, Nellissen only teaches localized electrical contacts to facilitate electronic connections. Therefore, claim 5 is also patentable over Nellissen. Accordingly, withdrawal of this rejection is respectfully requested.

B. Nellissen and Roberts

Claims 3 and 4 were rejected under 35 U.S.C. §103(a) as being unpatentable over Nellissen in view of U.S. Patent No. 5,584,120 ("Roberts"). To the extent that this rejection still applies to the amended claim, this rejection is respectfully traversed.

Roberts fails to provide that which Nellissen lacks with respect to claim 1. In

particular, Roberts teaches a process and apparatus for producing supported conductive networks, however Roberts is completely silent to "a second conductive layer formed on the second surface of said substrate, by which said conductive layer of one of said circuit layers is electrically connected to said conductive layer of another one of said circuit layers, wherein the second surface of said substrate includes a side surface of a projection on the first surface," as recited in claim 1.

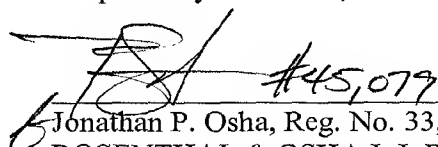
Therefore, claim 1 is patentable over Nellissen and Roberts, whether considered separately or in combination. Thus, claim 3 and 4, which depend directly from claim 1, are likewise patentable for at least the same reasons. Accordingly, withdrawal of this rejection is respectfully requested.

III. Concluding Remarks

Applicant believes this reply to be fully responsive to all outstanding issues and place this application in condition for allowance. Further, no new matter has been added by way of this reply, and thus, further consideration is not required. If this belief is incorrect, or other issues arise, do not hesitate to contact the undersigned or his associates at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 11411.002001).

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Respectfully submitted,


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